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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/050,113	03/30/1998	TAIJI EMA	980446	6454

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EXAMINER
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WARREN, MATTHEW E

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	Application No. 09/050,113	Applicant(s) EMA, TAIJI	
	Examiner Matthew E. Warren	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 12 and 14 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 4, 12 and 14 is/are allowed.
- 6) ☒ Claim(s) 2, 3 and 5-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

This Office Action is in response to the RCE and Preliminary Amendment filed on December 20, 2004 and January 24, 2005.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 2, 3, and 5-8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 2, discloses the limitation of "a sidewall insulation film formed on an inner wall of the contact hole and surrounding the contact hole." However, the specification does not explicitly state that the sidewall insulation film is "surrounding" the contact hole. The limitation of sidewall surrounding the contact hole, being critical to the invention is not even shown in any of the drawings. The drawings only show that the insulating film is formed on the sidewall of the insulation film, the gate, and etching stopper film. There are no overhead views showing the sidewall insulation film surrounding the contact hole at all. Again, the specification only discloses on page 38, that the sidewall insulation film is formed on the side walls of the interlayer insulating film and the side walls of the laminated film of the gate electrodes, the insulation film,

and the etching stopper film. Furthermore, the limitation of "surrounding the contact hole" suggests that the sidewall insulation film is not only formed on an inner wall of the contact hole but also is outside of it (surrounding it), which is definitely not supported by the specification. Because the specification does not specifically define how the sidewall insulation "surrounds" the contact hole, one of ordinary skill in the art might not be able to ascertain exactly how the film is further structurally formed in proximity to the contact hole.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 3, 5, and 6, as far as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukase (US 5,728,595) in view of Kimura (US 6,127,734).

Fukase shows (figs. 2A-2G) a base substrate (1), a first conducting film (4) formed over the base substrate and including a plurality (5, 4, 4a) of conductor patterns adjacent to each other, and an etching stopper film (6,7) covering an upper surface of the conductor patterns. A contact hole (15) is located in a part of a region between the adjacent conductor patterns and having an end defined by the conductor patterns. A first insulation film (13) fills spaces between the conductor patterns where the contact hole is not formed and does not extend over the etching stopper film. A sidewall

insulation film (17) is formed on an inner wall of the contact holes so that side walls of the conductor pattern and the etching stopper film are covered and surrounded (when viewed from above). Fukase shows all of the elements of the claims except the first insulation film being in contact with the side walls of the conductor patterns and filling spaces between the conductor patterns. Kimura shows (fig. 1) a semiconductor device in which conductor patterns (7) are formed on a substrate (1). A first interlayer insulating film (11) is formed on the substrate and is in contact with the side walls of the conductor patterns. In the configuration of an interlayer insulating film formed on gates without sidewall spacers, the device can be manufactured with a lower number of steps and higher degree of integration (col. 5, lines 50-56). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the contact structure of Fukase by forming the first interlayer insulation film on the sidewalls of the conductor patterns as taught by Kimura to simplify the manufacturing process and increase the degree of integration

In re claim 3, Fukase nor Kimura shows a plurality of contact holes are formed adjacent to each other with the conductor patterns therebetween. However, it would have been obvious to one of ordinary skill in the art to use three, four, etc., contact holes since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). See also MPEP 2144.04 VI. (B).

In re claims 5 and 6, Fukase shows (figs. 2A and 2G) a second insulation film (6) of silicon oxide, which is known to have a lower dielectric constant than the silicon

nitride etch stop layer (7), formed between the first conducting film and the etching stopper film. It is known in the art that an etching stopper could also be formed of a conducting film because it is well known in the art that a conductive film, such as metal would have a different etch selectivity as opposed to an insulator such as oxide. The second insulation film is provided as a buffer between the etching stopper and the first conducting film (col. 5, lines 43-54).

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukase (US 5,728,596) in view of Kimura (US 6,127,734) as applied to claim 2, 5, and 6 above, and further in view of. Hosotani et al. (US 5,977,583)

In re claim 7, Fukase and Kimura shows all of the elements of the claims except the etching stopper film formed only on a region where a first conducting film intersects a second conducting film. Hosotani et al. shows (fig. 16) a second conducting film (28) is formed on the first insulation film and connected to the base substrate in the contact hole (25). The etching stopper film (17 in fig. 13) is formed only in a region where the first conducting film intersects the second conducting film. With this configuration, the aspect ratio of bitline contacts can be decrease and misalignment (misregistration) of subsequent contacts is not detrimental to the device(col. 2, lines 21-38) . Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the contact structure of Fukase and Kimura by forming a second conducting film in region where the first conducting film intersects the second conducting film as taught by Hosotani to form reduced aspect ratio bitline contacts.

In re claim 8, Hosotani et al. discloses that the sidewall insulation film is formed of a silicon nitride which has etching characteristics equal to those of the etching stopper film because the etching stopper film is also made of silicon nitride (col. 8, lines 20-46).

***Allowable Subject Matter***

Claims 1, 4, 12 and 14 are allowed.

The following is an examiner's statement of reasons for allowance: The prior art references do not show a sidewall insulation film formed on inner walls of the first insulation film, each sidewall of the two conductor patterns, and each side wall of the etching stopper film in the contact hole wherein each of the etching stopper films is completely covered by the first insulation film and the respective sidewall insulation films. The prior art also does not show a plurality of bit lines formed over the first insulation film and extended in a second direction, an etching stopper film covering upper surfaces of the bit lines and a second insulation film filling spaces between the plurality of bit lines where the contact hole is not formed, wherein the second insulation film does not extend over the etching stopper film.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Response to Arguments***

Applicant's arguments with respect to claims 2, 3, and 5-8 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (571) 272-1737. The examiner can normally be reached on Mon-Thur and alternating Fri 9:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MEW

March 21, 2005

  
TOM THOMAS  
SUPERVISORY PATENT EXAMINER